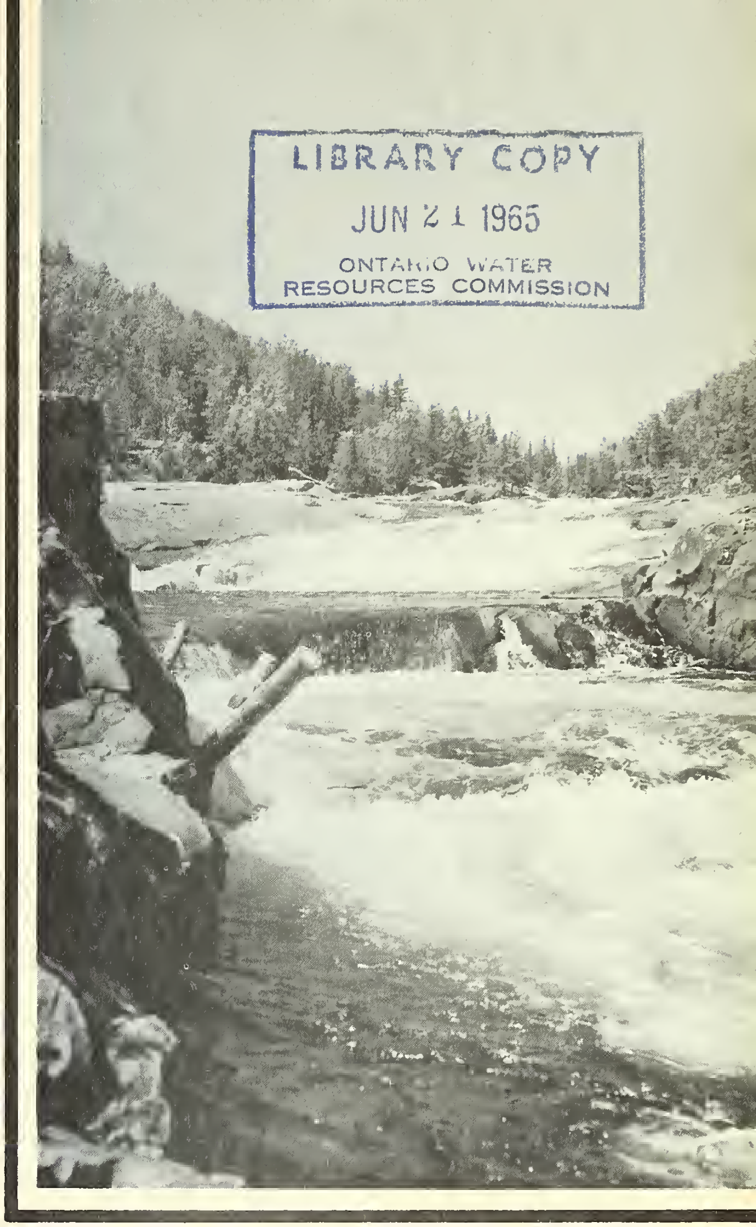
ONTARIO MINISTRY OF ENVIRONMENT
36936000020328

Goderich Water Treatment Plant



LIBRARY COPY
JUN 21 1965
ONTARIO WATER
RESOURCES COMMISSION

1963 Annual Report

TD
367
.A56
G63
1963
MOE

Ontario Water Resources Commission

TD
367
.A56
G63
1963

Goderich water treatment plant
: 1963 annual report.

82290

ONTARIO WATER RESOURCES COMMISSION
OFFICE OF THE GENERAL MANAGER

Mayor and Members of Council,
Township of Goderich.

Gentlemen:

I am pleased to submit, for your information, the 1963 Annual Operating Report of the Goderich Water Treatment plant, OWRC Project No. 60-W-69, which has been prepared by our Division of Plant Operations.

We are grateful for the kind cooperation which you and your staff have extended to our Operations staff throughout the year. We look forward to a continuing close association with you in our mutual endeavour to control pollution.

Yours very truly,

D. S. Caverly

D. S. Caverly,
General Manager

Digitized by the Internet Archive
in 2015

https://archive.org/details/goderichwatertre20328

D
27
G64
038
963
MoE

asyh

General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Goderich Water Treatment plant, OWRC Project No. 60-W-69 for 1963.

This report presents design data, outlines operating problems encountered and summarizes in tables, charts and graphs all significant flow and cost data.

Yours very truly,

B C Palmer

B. C. Palmer,
Director,
Division of Plant Operations

foreword

This report is designed to present the highlights of the operation of these works during 1963. Trends in flows and other operating data can be extremely useful in the development of necessary long range enlargement and improvement programs.

In addition to the activities reported herein, much unrecorded effort has contributed to the success of this operation. The municipality, through representatives on the Local Advisory Committee, has given valuable assistance in reviewing salary schedules, detailed operating budgets, personnel problems, flow patterns, and major maintenance problems.

The Division of Plant Operations has provided direction to the field staff in administrative procedures, quality control, maintenance schedules, equipment inspection and purchase supervision. A number of other Divisions of the Commission have been of service. The Division of Construction has offered helpful advice on equipment selection and renovation problems. The Division of Sanitary Engineering has maintained, through its District Engineering staff, a keen interest in the operation and has made a number of constructive recommendations. Its operator training courses have been very helpful. The Division of Finance has processed many payrolls, purchase orders and invoices dealing directly with this project. The Commission Personnel Director has been most helpful in the selection of new staff.

The excellent cooperation of all of these groups is gratefully acknowledged.

BCPalmer

B. C. Palmer,
Director,
Division of Plant Operations

ONTARIO WATER RESOURCES COMMISSION

DIVISION OF PLANT OPERATIONS

contents

Foreword................Page 1

Title Page...............Page 2

History..................Page 3

Project Staff............Page 4

Description of Project.....Page 5

Design Data..............Page 7

Plant Flow Chart..........Page 9

Process Data.............Page 10

Operating Costs...........Page 15

Summary.................Page 17

Total Costs.......Inside back cover

C. W. Perry
Assistant Director
D. McTavish
Regional Supervisor
B. G. Porter
Operations Engineer.

GODERICH WATER TREATMENT PLANT

OPERATED FOR

THE TOWNSHIP OF GODERICH

BY

THE ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN

A. M. Snider

COMMISSIONERS

W. D. Conklin, Q. C.

J. H. H. Root, M. P. P.

J. A. Vance, LL. D.

A. A. Wishart, Q. C., M. P. P.

GENERAL MANAGER

D. S. Caverly

ASSISTANT GENERAL MANAGERS

G. M. Galimbert
L. E. Owers

COMMISSION SECRETARY

W. S. MacDonnell

1960 to 1963 History

INCEPTION

In 1960, the Town of Goderich and the Ontario Water Resources Commission initiated plans for the construction of a modern water treatment plant.

The firm of James F. MacLaren Ltd., Toronto, consulting engineers, was engaged to prepare plans and specifications for the project.

APPROVAL

In May 1960, the town signed an agreement with the Ontario Water Resources Commission to finance,construct and operate the plant.

CONSTRUCTION

In early 1962, Bedford Construction Ltd. began construction and by November 16, 1962 the Division of Plant Operations took over the operation.

TOTAL COST

$1,010,714.26

Project Staff

CHIEF OPERATOR

M. Wilkinson

PLANT OPERATORS

M. McAdam
M. McKee
D. McPhail
G. Nelson

COMMENTS

The plant operators are on a twenty-four hour, seven day a week schedule. The Chief Operator is normally in attendance at the plant during the week from 8:00 AM to 4:00 PM. The shift schedule is on the basis of a 42 hour work week.

Four members of the new plant staff were former operators at the old water treatment plant.

Description of Project

INTAKE

The intake works consist of a rock-filled timber crib with cover plate and 1,606 feet of 30 inch diameter intake main. At the crib, the water depth ranges from 16.16 feet to 22.36 feet between minimum and maximum lake levels. Raw water is fed to the screen chamber or can be bypassed directly to the low lift pumping well.

SCREENING

Water is screened through a Link Belt type Model No. 45A Thru-flow, travelling water screen with clear openings of 3/8 inch. The screen is normally operated manually but is fitted for automatic starting at 2 inch W.G. differential and to sound an alarm at 4 inch W.G. differential.

LOW LIFT PUMPING

The low lift pumping well is divided into two compartments. The larger compartment has a volume of 1,880 cubic feet and can act for two low lift pumps. One pump is rated at 1.25 MGD at 28 feet T.D.H. and the other is rated at 0.75 MGD at the same head. The second compartment has a volume of 800 cubic feet. Water is pumped from this compartment by a pump rated at 1.25 MGD at 28 feet T.D.H.

All pumps are vertical, turbine type, centrifugal, electric driven pumps (Layne & Bowler). A diesel generator set is used to supply electricity throughout the entire plant in event of electric failure.

Low lift pump delivery is directly to the flash mixing chamber. A Venturi is inserted into this line for recording flow.

FLASH MIXING CHAMBER

Liquid or dry chemicals such as alum are mixed with raw water in the flash mixing chamber. It has a volume of 500 cubic feet which provides a detention period of 6.0 minutes at 0.75 MGD, 3.6 minutes at 1.25 MGD and 2.75 minutes at 2.0 MGD. One flash mixer unit (Link Belt No. 30) is installed in the flash mixing chamber. Water flows by gravity from the flash mixing chamber through a flume to the flocculating tanks.

FLOCCULATING TANKS

There are two flocculating tanks. Each tank has a volume of 4760 cubic feet. They provide a detention period of 114 minutes at 0.75 MGD, 57 minutes at 1.5 MGD and 42.6 minutes at 2.0 MGD.

Each tank is equipped with a Stuart-Carter (Ball Bearing) "Walking beam" type flocculator mechanism which have inverted V-type paddles moving straight up and down. From the flocculation tanks, the water overflows a submerged weir into the settling tanks.

SETTLING TANKS

There are four settling tanks that operate in parallel. Each tank has a volume of 4,790 cubic feet. They provide a detention period of 3.82 hours at 0.75 MGD, 1.91 hours at 1.5 MGD, and 1.43 hours at 2.0 MGD. Sludge is scraped manually to a hopper fitted with an outlet mud valve at the upstream end of the tanks and is discharged through a 10 inch diameter pipe to the common plant sewer system which runs directly to the lake. At the downstream end of the tanks, water flows over four submerged weirs into a common header flume and thence to the surface of the sand filters.

SAND FILTERS

There are four rapid sand filters. Each has a surface of 144 square feet providing a total surface area of 576 square feet. The filtration rate at 1.5 MGD is equal to 2.16 US G PM/sq. ft. and at 2.0 MGD is equal to 2.9 USGPM /sq. ft. Each filter is equipped with rotary surface agitators.

Water for backwashing the filters is pumped from the high lift pump well by oneLayne and Bowler electric drive vertical turbine pump rated at 4,165 US GPM at 40 feet T. D. H. Backwash waste discharges to the plant sewer system. Filtered water is run to a clear well.

CLEAR WELL

The clear well consist of two interconnected sections located beneath the settling tanks and filters. Including the high lift pump well, the clear well capacity is around 20,800 cubic feet. Post-chlorination is provided at the clear well.

HIGH LIFT PUMPING

Filtered water flows through a 24 inch diameter bottom outlet pipe from the clear well to the high lift pump wells. These pumps are arranged in a similar fashion to those used in the low lift well with pumps rated at the same flows (i. e two at 1.25 MGD and one at 0.75 MGD). The high lift pumps feed through a common header directly into the distribution system. Flow to the distribution system is also metered.

Design—Data

GENERAL

Type of plant - Rapid sand filter

Design Capacity - 1.5 MGD
2.0 MGD for short periods of time.

Source of Water - Lake Huron

INTAKE

One rock filled timber crib with cover plate and 1606 feet of 30 inch diameter main.

SCREENING

One Link-Belt Model No. 45A Thru-flow travelling water screen with clear openings of 3/8 inch. The screen is three feet wide and 23 feet deep. Travelling speed is 10 feet per minute. Control will be manual normally. However, it will start automatically with a 2 inch differential. An alarm will ring at a 4 inch differential.

LOW LIFT PUMPING

Two low lift pumps rated at 1.25 MGD and 0.75 MGD at 28 feet T.D.H. in one low lift raw water well. One low lift pump rated at 1.25 MGD at 28 feet T.D.H. in the adjacent raw water well.

FLASH MIXER

Tank dimensions are 7.67 feet square by 8.5 feet deep. Mixer is a Link-Belt No. 30 which is equipped with a 30 inch propellor at a maximum speed of 125 RPM and is powered by a 3 HP Tamper squirrel cage induction motor.

FLOCCULATING TANKS

Two flocculating tanks, each 20.5 feet wide, 14.5 feet long by 15.25 feet average water depth. Walking beam V-type paddles are used. Paddles are constructed of 2 inch by 6 inch cyprus wood.

SETTLING TANKS

Four settling tanks, each 61.5 feet long, 10.25 feet wide by 7.6 feet deep. Sludge is scraped manually to a hopper fitted with an outlet mud valve at the upstream end of the tanks. Sludge is discharged through a 10 inch diameter pipe to the common plant sewer system which runs directly to the lake.

SAND FILTERS

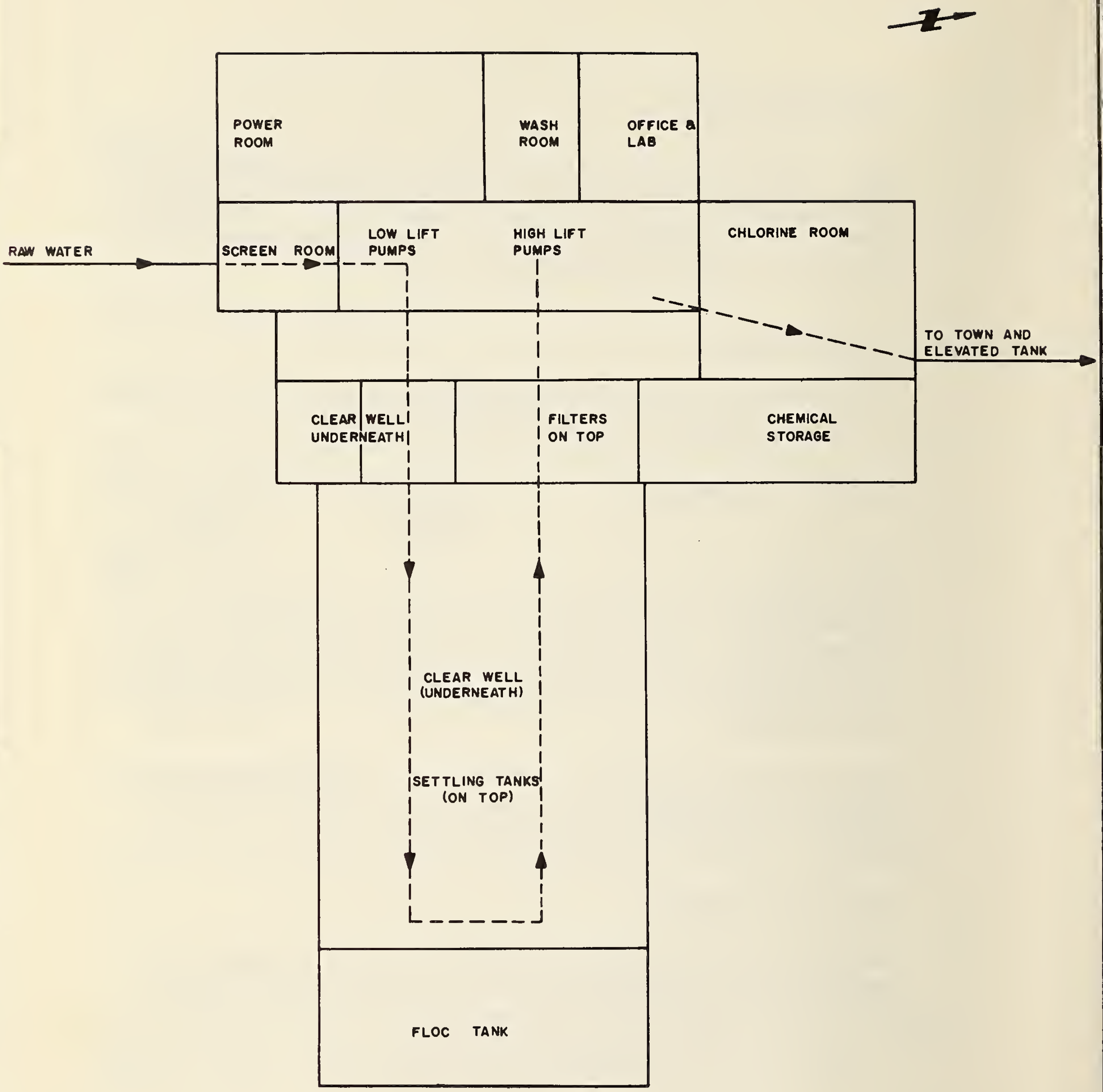
Four units each with surface dimensions of 12 feet by 12 feet. Filter media is arranged according to the following table.

LAYER DESCRIPTIONS	THICKNESS (inches)	PARTICLE SIZE LIMITS
Sand (top)	24	0.5 to 0.55 MM
Gravel (6th)	5	2" to 1"
Gravel (5th)	2	1" to 1/2"
Gravel (4th)	2	1/2" to 1/4"
Gravel (3rd)	4	1/4" to 1/8"
Gravel (2nd)	2	1/2" to 1/4"
Gravel (bottom)	2	1" to 1/2"

The design filtration rate at 1.5 MGD is 2.16 USGPM/square foot. Each filter is supplied with a 4 foot, 11 inch Palmer sweep filter agitator. Filters are of the rapid sand type.

HIGH LIFT PUMPING.

High lift pumps are arranged similarly to the low lift pumps. Two pumps rated at 1.25 MGD and one at 0.75 MGD at 28 feet T. D. H.



GODERICH W.T.P.
PLANT LAYOUT
AND
WATER FLOW

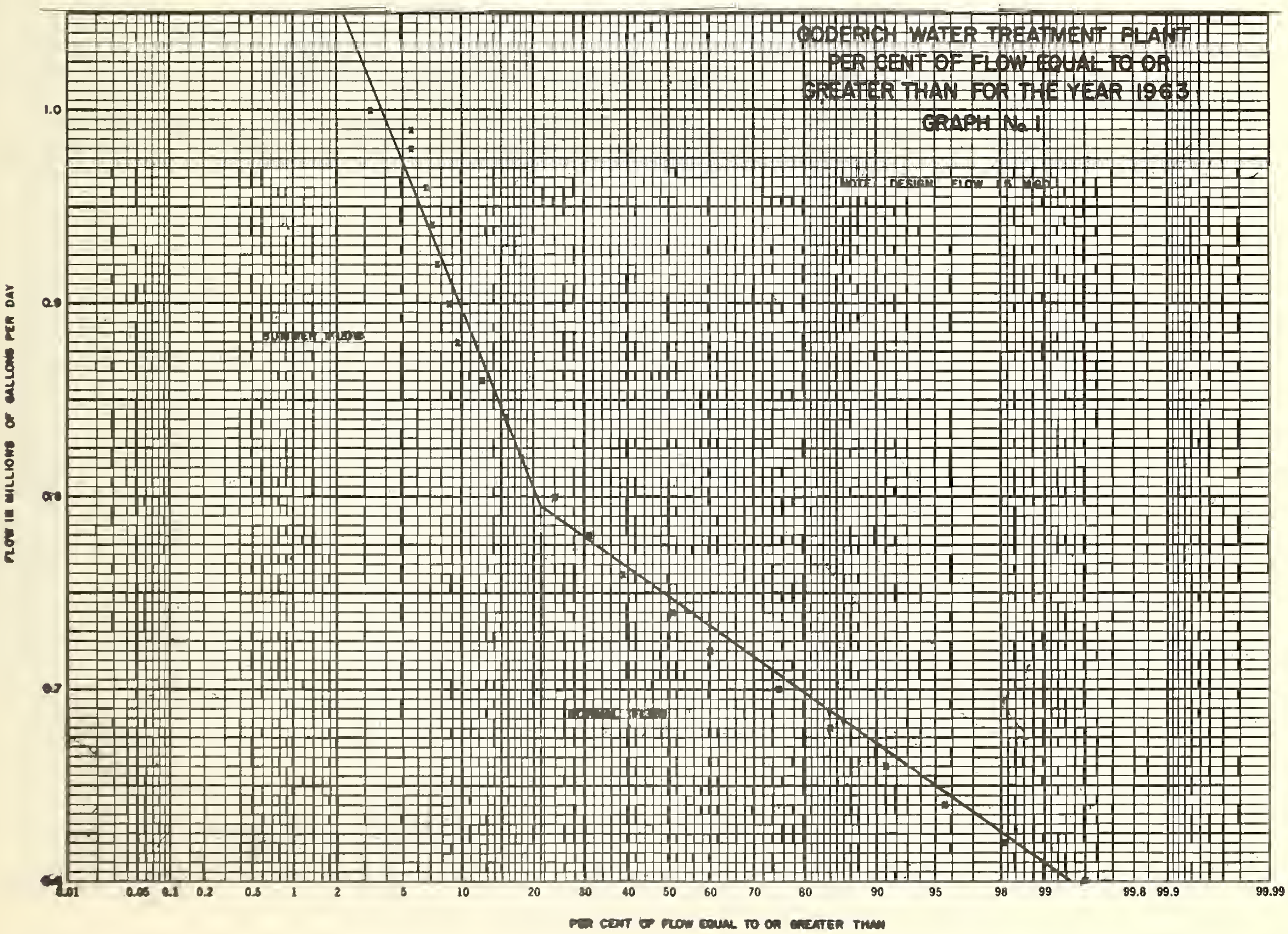
Process Data

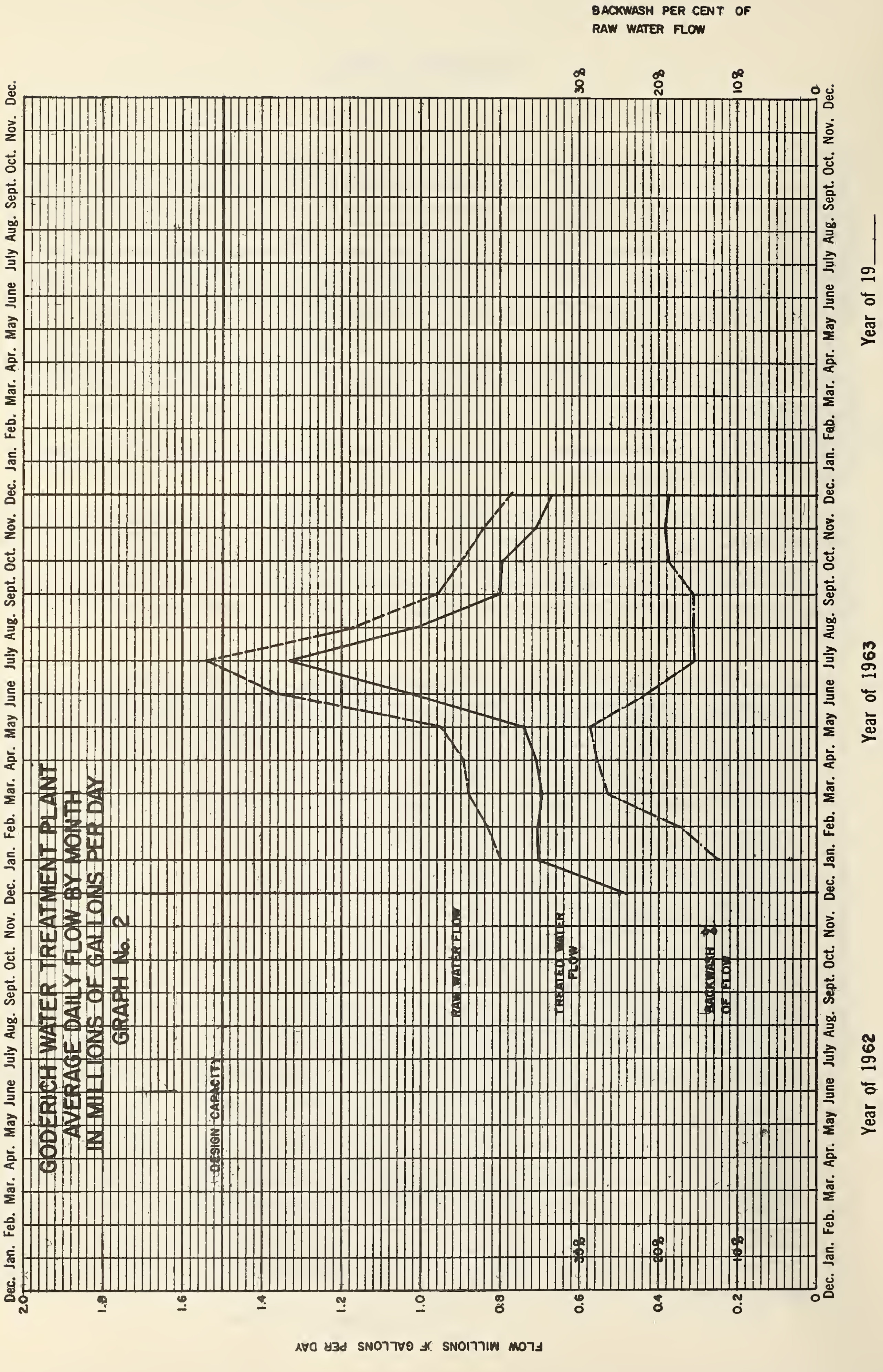
During the period from the beginning of January to the end of July, the demand for treated water progressively increased. The demand increased sharply during January and during June and July. In January the average treated water flow increased from 0.48 MGD to 0.70 MGD. From the beginning of June to the end of July the demand rose from 0.74 MGD to 1.33 MGD. Lawn watering was the dominant factor influencing the increase in demand during June and July. No water restrictions were in force during this period. If high demands continue to occur, it may be necessary to enforce water restrictions in order to ensure that an adequate supply of water is available for residential and industrial use.

Treated water demands progressively decreased to 0.67 MGD during the remainder of the year. The demand decreased sharply during August and September from 1.33 MGD to 0.80 MGD.

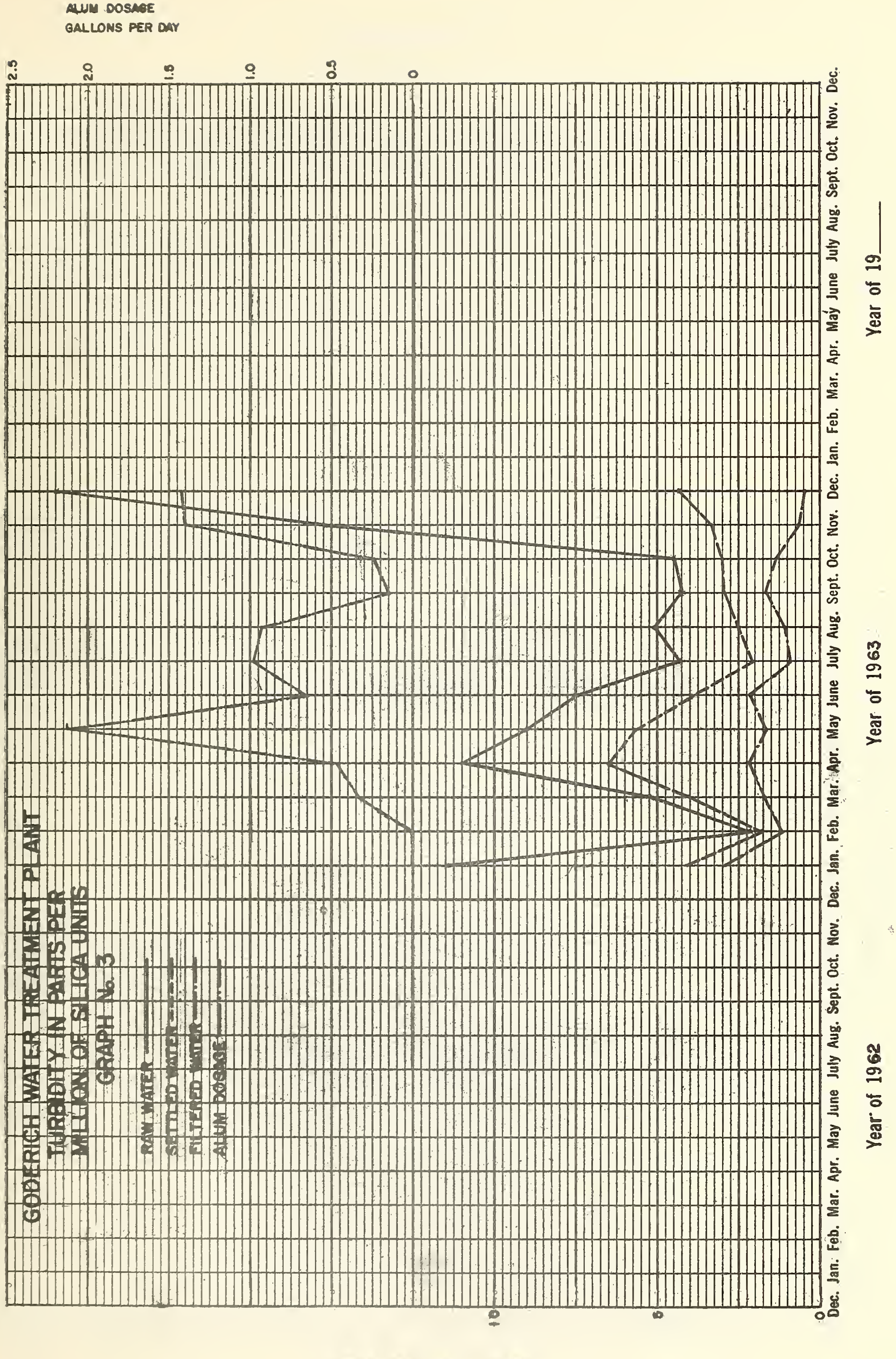
Average daily raw water flows, treated water flows and back wash flows are plotted by month on Graph number two.

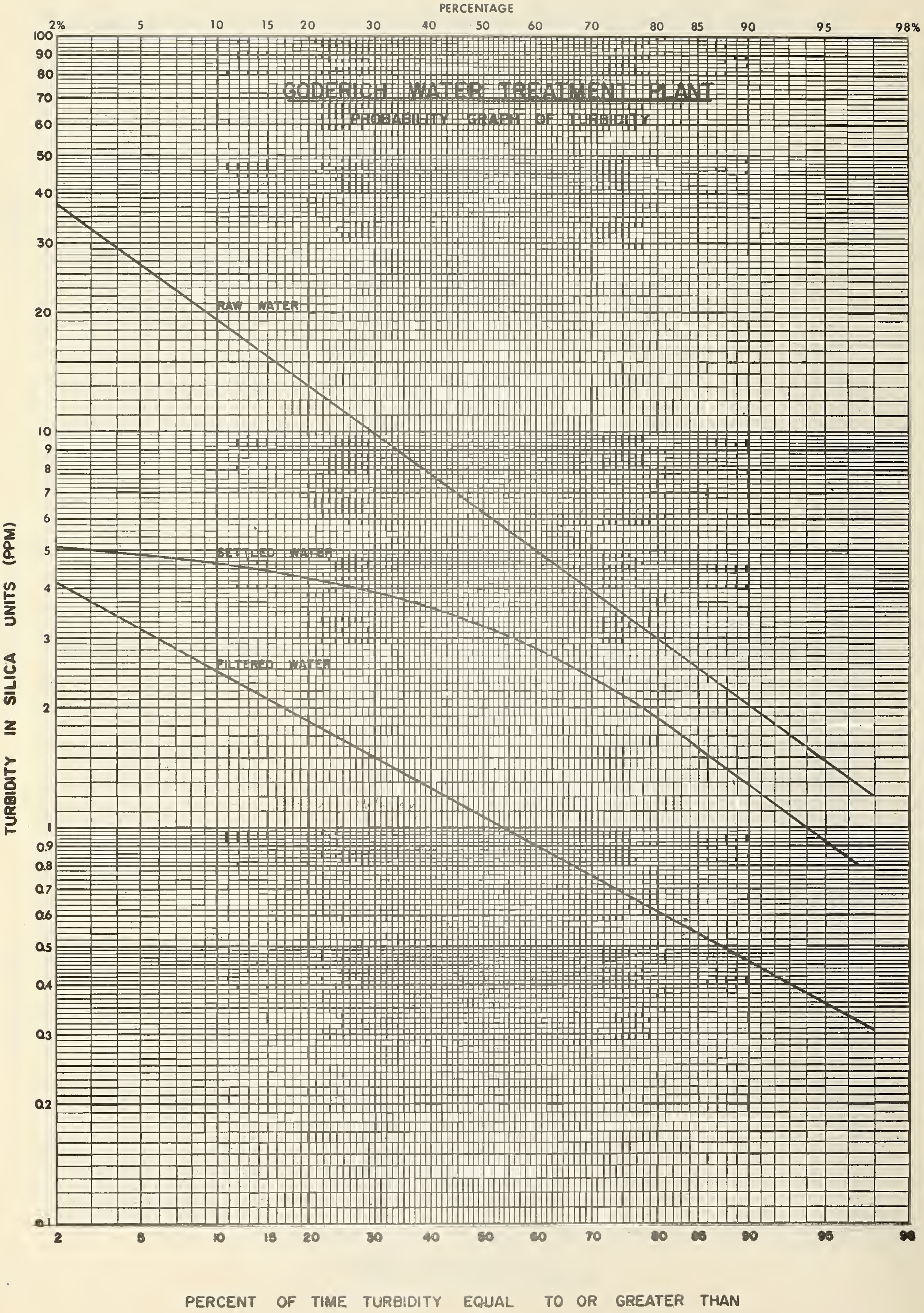
Normal demands and excess demands due to lawn watering are clearly defined on Graph number one. The left portion of the graph shows the summer flows and the right portion shows the normal flows. Treated water demands in excess of 0.80 MGD occurred during the summer and consist of the sum of residential, industrial and lawn watering demands. Demands less than 0.80 MGD can be considered as normal demands excluding lawn watering.





GODERICH WATER TREATMENT PLANT
AVERAGE DAILY FLOW BY MONTH
IN MILLIONS OF GALLONS PER DAY
GRAPH No. 2


GODERICH WATER TREATMENT PLANT
TURBIDITY IN PARTS PER MILLION OF SILICA UNITS
GRAPH No. 3
RAW WATER
SETTLED WATER
FILTERED WATER
ALUM DOSAGE
ALUM DOSAGE
GALLONS PER DAY
2.5
2.0
1.5
1.0
0.5
0
TURBIDITY (P.P.M.) SILICA UNITS
10
5
0
Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
Year of 1962
Year of 1963
Year of 19


PERCENTAGE
2%
5
10
15
20
30
40
50
60
70
80
85
90
95
98%
GODERICH WATER TREATMENT PLANT
PROBABILITY GRAPH OF TURBIDITY
RAW WATER
SETTLED WATER
FILTERED WATER
TURBIDITY IN SILICA UNITS (PPM)
100
90
80
70
60
50
40
30
20
10
9
8
7
6
5
4
3
2
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
PERCENT OF TIME TURBIDITY EQUAL TO OR GREATER THAN

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (P.P.M.)
JANUARY	.710	6.5	.91
FEBRUARY	.720	5.3	.74
MARCH	.695	7.0	1.00
APRIL	.705	6.9	.98
MAY	.740	7.8	1.05
JUNE	1.119	9.7	.87
JULY	1.335	10.9	.82
AUGUST	1.015	8.9	.88
SEPTEMBER	.803	8.1	1.01
OCTOBER	.798	6.9	.86
NOVEMBER	.710	7.5	1.06
DECEMBER	.672	6.2	.92
TOTAL		91.7	
AVERAGE	.835	7.6	.92

COMMENTS

During 1963 it was found that an average dosage of 0.92 ppm chlorine was required to maintain a residual of 0.3 ppm free chlorine in the filtered water. This may be considered normal.

1963

PLANT

Total Operating Costs

MONTHLY

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	WATER
JAN	1980	1525			417		36			3	
FEB	2411	1525			476		153		24	229	
MARCH	2035	1525			444		17			45	
APRIL	2035	1525			469		15			22	
MAY	2096	1525			487		74			4	
JUNE	2506	1534			447		27			493	
JULY	2985	2310			537		95		18	23	
AUG	3448	1534			1	861	114			934	
SEPT	2711	1534			1004	28	73		58	10	
OCT	2081	1534			406		36	89		11	
NOV	3106	1534			403		49	79		911	
DEC	3004	2301			449		24	190	12	24	
TOTAL	30397	19903			5539	889	713	358	111	2708	

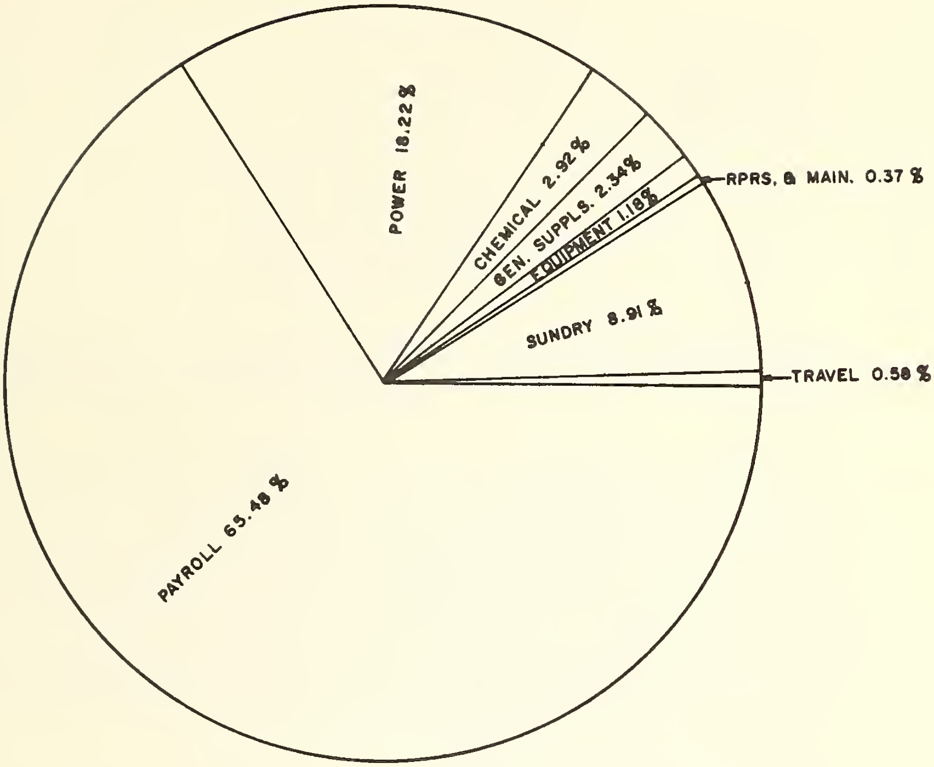
ALL FIGURES TO NEAREST DOLLAR.

PLANT

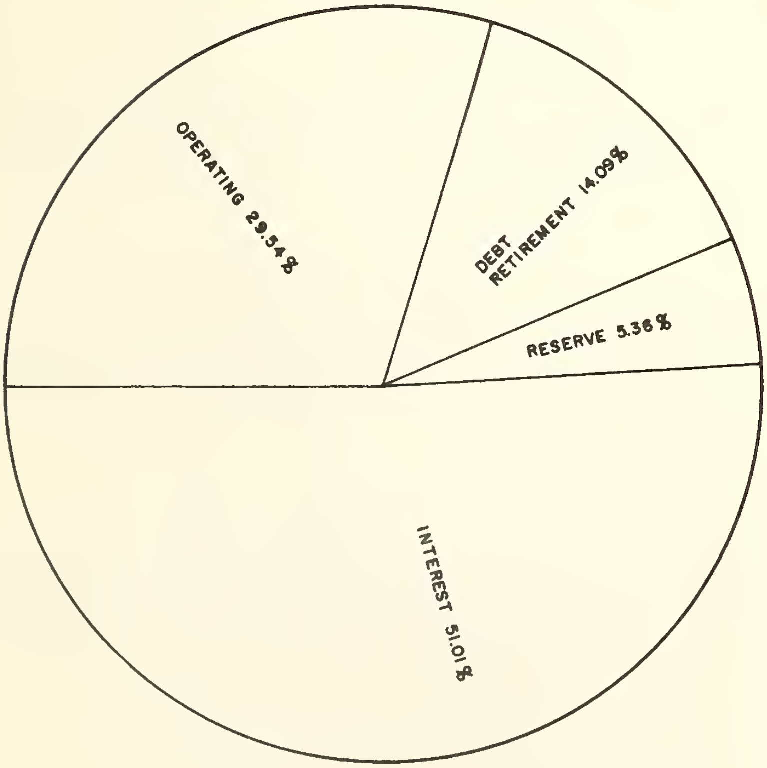
YEARLY

YEAR	M.G. TREATED	TOTAL COST	COST PER THOUSAND GALLONS	COST PER CAPITA PER YEAR
1963	305.271	30,397	$ .10	4.57

BASED ON 1963 ASSESSED POPULATION OF 6,657.



1963 OPERATING COSTS



TOTAL ANNUAL COSTS

SUMMARY

This report has given in detail significant data on the operation of the various treatment units of the Goderich Water Treatment Plant.

With an average daily flow of 0. 835 million gallons, the flow appears to be well below average. However, as the flow varies greatly, we find that during peak flows during the summer the flow has on one occasion exceeded design to the extent that the town was without water for several hours. It has been proposed that lawn watering restrictions will reduce flow and a bypass which will allow pumping of lake water directly into the system will take care of fire or other extreme emergency.

TREATED WATER QUALITY

The treated water quality was excellent throughout the year and was acceptable by OWRC standards at all time.

RAW WATER QUALITY

The quality of the raw water was generally good, but there is a considerable time in the warm spring and summer months when filter plugging algae and heavy weeds made operation exceedingly difficult.

COST

The operating costs are about what is expected for a plant of this size. It would normally be expected that this cost will increase with time as more money will be spent on repairs and maintenance as the plant gets older.

PLANT

The staff has maintained a clean attractive and efficient plant for the Town of Goderich; special attention has been given to good public relations and many visitors particularly of school age have visited the plant during the year.

Total 1963 Costs

The total cost to the municipality during 1963 was as follows:

Operating Cost	$ 30,397.20
Debt Retirement Cost	$ 14,496.00
Reserve	$ 5,518.00
Interest	$ 52,489.73
TOTAL	$102,900.93

Note: The amount in the Reserve for Contingencies fund was as of December 31, 1963 - $5,634.00.

TD
367
.A56
G63
1963

Goderich water treatment plant
: 1963 annual report.

82290

Environment Ontario
Laboratory Library
125 Resources Rd.
Etobicoke, Ontario M9P 3V6
Canada

Division of Plant Operations

ONTARIO WATER RESOURCES COMMISSION
801 BAY ST. TORONTO 5